What is claimed is:

1. A method of preparing a poly-crystalline silicon film comprising:

supplying reactive gases and carrier gases to a process chamber of a plasma chemical deposition system including a substrate;

depositing an amorphous silicon film on the substrate by plasma discharging at a temperature 400°C or more;

after film deposition, transporting the substrate from the process chamber to a heating chamber attached to the plasma chemical deposition system without exposing the substrate to atmosphere external to the system and holding the substrate in the heating chamber to carry out dehydrogenation treatment of the amorphous silicon film;

removing the substrate from the heating chamber after the dehydrogenation treatment; and

irradiating the amorphous silicon film with a laser beam thereby changing the amorphous silicon film into a poly-crystalline silicon film.

2. A method according to claim 1, wherein the temperature of the substrate in the heating chamber is higher than that in the process chamber.

3. A method according to claim 1, wherein the plasma chemical deposition system is a cluster-type plasma chemical deposition system.

4. A method of preparing a thin film transistor comprising:

supplying reactive gases and carrier gases to a process chamber of a plasma chemical deposition system including a substrate;

depositing an amorphous silicon film on the substrate by plasma discharging at a temperature 400°C or more;

after film deposition, transporting the substrate from the process chamber to a heating chamber attached to the plasma chemical deposition system without exposing the substrate to atmosphere external to the system and holding the substrate in the heating chamber to carry out dehydrogenation treatment of the amorphous silicon film;

removing the substrate from the heating chamber after the dehydrogenation treatment;

irradiating the amorphous silicon film with a laser beam thereby changing the amorphous silicon film into a poly-crystalline silicon film; and

forming a thin film transistor including the poly-crystalline silicon as an active semiconductor layer.

5. A method of preparing an active-matrix type liquid crystal display device comprising:

supplying reactive gases and carrier gases to a process chamber of a plasma chemical deposition system including a substrate;

depositing an amorphous silicon film on the substrate by plasma discharging at a temperature 400°C or more;

after film deposition, transporting the substrate from the process chamber to a heating chamber attached to the plasma chemical deposition system without exposing the substrate to atmosphere external to the system and holding the substrate in the heating chamber to carry out dehydrogenation treatment of the amorphous silicon film;

removing the substrate from the heating chamber after the dehydrogenation treatment;

irradiating the amorphous silicon film with a laser beam thereby changing the amorphous silicon film into a polycrystalline silicon film; and

forming an active-matrix type liquid crystal display device including a thin film transistor formed from the polycrystalline silicon as an active semiconductor layer.

6. A method according to claim 1, wherein the depositing step is carried out with reactive and carrier gases supplied to the process chamber and the dehydrogenation treatment is carried out with the carrier gas supplied to the heating chamber.

7. A method according to claim 1, wherein the dehydrogenation treatment is carried out without a reactive gas.

8. A method according to claim 1, wherein irradiating step comprises the step of irradiating with an excimer laser beam.

9. A method according to claim 1, wherein the dehydrogenation treatment reduces the hydrogen content of the amorphous silicon film to less than 10 %.

10. A method according to claim 1, wherein a period of leaving time t (seconds) of the substrate in the heating chamber, a thickness d (angstroms) of the amorphous silicon film, and a temperature (°C) of the heating chamber at the time when the substrate is left in the chamber satisfy the following equation (1):

$$t > d^2 / (A \times \exp B) \qquad (1)$$

where

$A = 6.0 \times 10^{14}$,

$B = - 2.56 \times 10^{-19} / (k \times (273 + \theta))$, and

$k = 1.38 \times 10^{-23}$.

11. A method according to claim 1, wherein the plasma chemical deposition system is a single substrate processing plasma chemical deposition system.

12.. A method according to claim 1, wherein transporting the substrate to the heating chamber is carried out through a path in a nitrogen or inactive gas atmosphere.

13. A method of preparing a poly-crystalline silicon film comprising:

depositing an amorphous silicon film on a substrate by a plasma chemical vapor deposition process to be carried out in a reaction chamber, the depositing step being carried out while a heater heats the substrate at a predetermined temperature and the dehydrogenation treatment is carried out with the heater set at the temperature, the temperature being 400°C or more;

setting the pressure of the chamber higher than the pressure of the chamber during the depositing step and leaving the substrate in the chamber to carry out dehydrogenation treatment of the amorphous silicon film; and

poly-crystallizing the amorphous silicon film after the dehydrogenation treatment.

14. A method of preparing a thin film transistor comprising:

depositing an amorphous silicon film on a substrate by a plasma chemical vapor deposition process to be carried out in a reaction chamber, the depositing step being carried out while a heater heats the substrate at a predetermined temperature and the dehydrogenation treatment is carried out

with the heater set at the temperature, the temperature being 400°C or more;

setting the pressure of the chamber higher than the pressure of the chamber during the depositing step and leaving the substrate in the chamber to carry out dehydrogenation treatment of the amorphous silicon film;

poly-crystallizing the amorphous silicon film after the dehydrogenation treatment; and

forming a thin film transistor using the poly-crystalline silicon as an active semiconductor layer.

15. A method according to claim 13, wherein the depositing step is carried out with reactive and carrier gases supplied to the chamber and the dehydrogenation treatment step is carried out with the carrier gas supplied to the chamber.

16. A method according to claim 13, wherein the dehydrogenation treatment is carried out without a reactive gas.

17. A method according to claim 13, wherein the poly-crystallizing step is carried out by irradiation with laser beams.

18. A method according to claim 13, wherein the dehydrogenation treatment reduces the hydrogen content of the amorphous silicon film to less than 10 %.

19. The method of preparing a poly-crystalline silicon film according to claim 13, wherein a period of leaving time t (seconds) of the substrate in the heating chamber, a thickness d (angstroms) of the amorphous silicon film, and a temperature θ (°C) of the chamber at the time when the substrate is left in the chamber satisfy the following equation (1);

$$t > d^2 / (A \times \exp B) \quad (1)$$

where

$A = 6.0 \times 10^{14}$,

$B = - 2.56 \times 10^{-19} / (k \times (273 + \theta))$, and

$k = 1.38 \times 10^{-23}$.